



Greetings Riverwatchers!

Once again, the leaves are showing their true colors of scarlet and gold. The geese are heading south, and the days are shortening. Fall activities are marked on the calendars, but our scheduled workshops have come to an end. In 2022, 16 workshops were conducted, some by new instructors for their first times. Through those workshops, over 150 participants were trained as Hoosier Riverwatch volunteers, joining over 4,400 volunteers who have completed the training previously. As of mid-October, 298 sampling events have been conducted across the state. Nearly 2,300 individual tests, i.e. habitat evaluation, dissolved oxygen, etc., were conducted and added to the Hoosier Riverwatch database in 2022. This number is sure to rise before the end of the year as volunteers often sample through December.

Workshops throughout the year have returned exceedingly positive evaluations from participants. A workshop participant in South Bend, instructed by Jan McGowan, stated *“I have been to many trainings over the years, and this was one of the best ever. I felt that the program was at the perfect level for me, and I thoroughly enjoyed it”*.

I applaud Jan and each of our volunteer instructors for another outstanding year of engaging workshops. I’d like to express additional thanks to all those who have submitted data to the Hoosier Riverwatch database. Your devoted time and efforts are vital in accomplishing the goals of the program.

Dylan Allison
Hoosier Riverwatch Coordinator

Fall 2022

In this Issue:

Clean Water Act
50th Anniversary

Emma Creek
Success Story

Youth Outreach

PocketMacros

The Collective Tap

Upcoming
Workshops

Check back in 2023
for scheduled
workshops!

Hoosier
Riverwatch is
sponsored by



Happy 50th Anniversary to the Clean Water Act!

On October 18th, 1972, U.S. legislation revised the Federal Water Pollution Control Act of 1948 with amendments collectively known today as the Clean Water Act (CWA). Until that point, the nation had been facing many challenges involving water pollution. “A 1969 study found that bacteria levels in the Hudson River to be at 170 times the legal limit. The same year, pollution from local food processing plants killed 26 million fish in one lake in Florida, the largest fish kill on record, and an oil slick resulted in an infamous fire on the Cuyahoga River near Cleveland.” (<https://www.history.com/this-day-in-history/clean-water-act-becomes-law>).



Photo Courtesy: Assoc. of Clean Water Administrators

This new legislation gave the Environmental Protection Agency (EPA), established only two years prior, authority to monitor, regulate, and enforce water quality standards. Much of the focus was placed on point-source pollution, discharged from specific origins like sewers or factories. Non-point source pollution was recognized as another concern in which planning and mitigation was required. Additionally, the CWA allowed federal funds to be used by municipalities across the nation to create or improve wastewater treatment facilities.

Although challenges still exist, data shows that there have been monumental improvements to the nation's waterways in the last 50 years. The Association Clean Water Administrators (ACWA) has highlighted success stories this summer in celebration of the anniversary. Of the 18 national success stories, two fell within Indiana.

The first story highlights the Eel River watershed in northeast Indiana. Jerry Sweeten, a professor at Manchester University, proposed the removal of low-head dams to reconnect the river for fish passage. Coordination with the Ohio River Basin Fish Habitat Partnership and the National Fish Passage Program resulted in the removal of six low-head dams by the spring of 2022. Over 1,100 miles of streams are now connected within the watershed without barriers to fish movement.



Photo Courtesy: Assoc. of Clean Water Administrators



Photo Courtesy: Assoc. of Clean Water Administrators

In one location, at the Stockdale Mill, a fish ladder was implemented to facilitate the movement of fish. A study showed that at least 47 of the 57 known species in the Eel River have used this fish ladder. Other studies show an increase in the Index of Biotic Integrity (IBI) which correlates to a healthier ecosystem. The removal of low-head dams has also eliminated safety risks, opening the stream up for more recreation like paddling and fishing. The project was, in part, funded by grants provided through the Clean Water Act.

The second success story surrounds the Blue River watershed of south-central Indiana. The area is largely known for its large tracts of undeveloped forests, limestone bluffs, and scenic landscapes. In fact, the high-quality stream is designated as an outstanding state resource by Indiana's Natural Resource Commission. The Blue River is currently the only river in the state to support the Eastern Hellbender, a state-endangered salamander. This aquatic salamander, which requires cool, clean, well-oxygenated water, is an important link in the food chain. Considered an indicator species, the presence of Hellbenders often points to a healthy ecosystem. Their sensitive nature has caused issues; populations of Hellbenders have been in decline since the 1980s. Efforts are being made to reverse that trend.



Photo Courtesy: Assoc. of Clean Water Administrators



Photo Courtesy: Assoc. of Clean Water Administrators

Captive breeding programs, conducted through partnerships with Purdue University, Indiana DNR, and local zoos, have allowed for the release and reintroduction of the species in certain waterways. IDEM has partnered with local watershed groups to implement best management practices to improve water quality. Multiple grants totaling over \$2,000,000 have been awarded through IDEM to put these practices in place. These conservation practices have prevented over 700,000 tons of sediment, 300 tons of phosphorus, and 600 tons of nitrogen from entering the waterways. Additionally, two low-head dams were removed to allow the movement of Hellbenders. Of course, other freshwater organisms will benefit from the healthier ecosystem as well.

The Clean Water Act has proven successful in improving the waterways of the nation. However, there are still improvements that can be made. We still have waterways on the List of Impaired Waters. We still have an opportunity to educate the public. We still have a chance to implement best management practices in our watersheds. In short, we still have a lot of work to do. But I'm excited and optimistic for what the next 50 years under the Clean Water Act will hold.

See more Clean Water Act success stories at [ACWA Stories](#).



Section 319

NONPOINT SOURCE PROGRAM SUCCESS STORY

Indiana

Reducing Livestock-Induced Pollution in Emma Creek

Waterbody Improved

Agricultural runoff resulted in impaired biological conditions and failure to attain ammonia standards in a tributary of Indiana's

Emma Creek. As a result, the Indiana Department of Environmental Management (IDEM) listed the Emma Creek tributary on the Clean Water Act (CWA) section 303(d) list in 2002. Numerous partners implemented best management practices (BMPs) throughout the Emma Creek watershed, resulting in decreased pollutant runoff. This has resulted in improved water quality in Emma Creek.

Problem

Emma Creek is a tributary to the Little Elkhart River, which flows through southeastern Lagrange County in northeastern Indiana. The 22,000-acre Emma Creek watershed includes 38.2 stream miles. Of these stream miles, 15.5 drain to Emma Lake. From the outlet of Emma Lake, Emma Creek flows another 3.8 miles to its confluence with the Little Elkhart River (Figure 1).

A tributary of Emma Creek was monitored by IDEM's Probabilistic Monitoring program in 2000. Analysis of fish community data showed an Index of Biotic Integrity (IBI) score of 14, which was well below the IBI score of ≥ 36 that is necessary to be considered supportive of biological integrity. In addition, habitat and chemistry data collected by IDEM in 2000 revealed that siltation, excess nutrients and low dissolved oxygen (particularly during the summer months) contributed to impaired biotic communities in the Emma Creek tributary. In addition, water sample analysis showed an ammonia level of 4.60 milligrams per liter (mg/L), much higher than the 2.1445 mg/L allowed by the water quality standard for the associated temperature and pH results measured concurrently at the site. These results prompted IDEM to add a 2.32-mile segment (Assessment Unit [AU] INJ01E1_T1301) to the 2002 CWA section 303(d) list for impaired biotic communities (IBC) and ammonia. Suspected pollutant sources included barnyard runoff, failing septic systems, and livestock accessing streams (and directly depositing waste and causing stream erosion).

Project Highlights

The Lagrange County Soil and Water Conservation District (SWCD) developed a watershed management plan (WMP) for the Little Elkhart River in 2007, using water quality data collected from June 2005

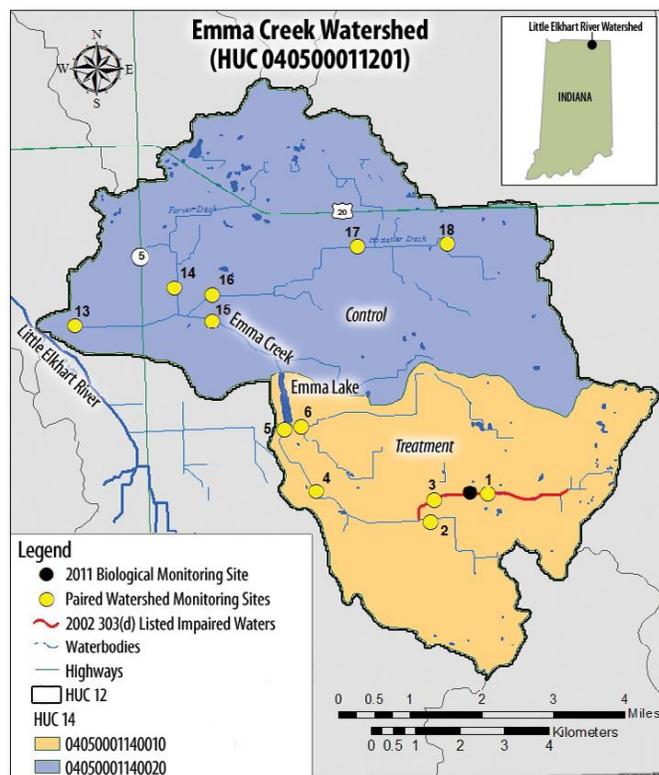


Figure 1. The Emma Creek watershed, in northeastern Indiana, was the subject of a paired watershed study.

through December 2006 to guide the efforts. As part of the WMP implementation, the SWCD conducted a paired watershed study on the upper and lower Emma Creek subwatersheds from 2009 to 2011 (see Figure 1). In the paired study, the partners implemented BMPs in the upper watershed, which was the treatment watershed. The lower watershed was the control watershed. As part of this project, landowners installed BMPs in the Little Elkhart River watershed between 2009 and 2010, includ-

ing 12 comprehensive nutrient management plans, two manure management plans, six heavy use area plans, four alternative watering facilities, three water access structures, three stream crossings, two pipe crossings, one livestock stream crossing, two critical area plantings (1.65 acres total), one waste storage facilities, 3.5 acres of filter strips, one waste management diversion and 20,493 feet of fencing (1,400 feet of which were installed upstream of the impaired segment). In a separate effort, the Natural Resources Conservation Service (NRCS) worked with landowners to install 24 acres of pasture and hay planting throughout the watershed between 2000 and 2009.

Key to this restoration effort was the participation of members of the Amish community, who comprise about 75 percent of the agrarian population of the Emma Creek watershed. Participation in cost-share programs by this community has been traditionally low. Outreach and education proved to be a successful strategy in convincing the community to change their management practices to protect water quality, including installing some BMPs without financial assistance.

Results

Thanks to the BMPs implemented in the treatment watershed, water in the Emma Creek Tributary is improving. Data collected along the impaired segment (Site 1 on Figure 1) show that pollutant levels decreased in 2009–2010 as compared to 2007–2008 (Table 1). Data collected by the SWCD at the mouth of Emma Creek showed similar improvements in water quality, indicating that the benefits realized by the BMPs implemented in the upper watershed carry down through the treatment watershed and into the Little Elkhart River. Net load reductions in the Emma Creek 12-digit watershed were 42 percent for *E. coli*, 20 percent for nitrates, 58 percent for total suspended solids, 63 percent for total phosphorus, and 89 percent for ammonia. With the exception of *E. coli*, all of these parameters are associated with watershed-based improvements eventually leading to healthier biological communities.

In 2011 IDEM returned to the 2.32-mile-long impaired stream reach (Emma Creek Tributary) to monitor for change in the fish community. The IBI score remained at 14, indicating that no significant change in biological condition has yet occurred. These data are being interpreted as evidence of a time lag between BMP implementation and habitat recovery.

Table 1. A comparison of means for selected nonpoint source pollution-related parameters at two sites on Emma Creek, before (2007–2008) and after (2009–2010) BMP implementation

Parameter ¹	Site 1 (Tributary of Emma Creek)		Site 13 (Mouth of Emma Creek)	
	2007–2008	2009–2010	2007–2008	2009–2010
Turbidity (ntu)	13	8.8	74	56
TSS	23.4	17.2	107	27
Nitrate	1.1	1.1	3.1	2.8
Total Phosphorus	0.497	0.287	2.01	0.57
Biological Oxygen Demand	1.31	0.72	2.05	1.15
Ammonia	0.15	0.11	0.11	0.09
<i>E. coli</i> (cfu/100 mL)	1,147	750	17,109	16,483

¹ All units are mg/L unless otherwise noted.

Although the SWCD data appear to show that ammonia levels are meeting water quality standards, an ammonia delisting can't occur until a third-party data program to measure the quality of the data is in place. Therefore, the impaired segment will remain listed as impaired for both IBC and ammonia. In 2014, Indiana revised its segmentation methodology. The existing, 2.3-mile-long impaired segment has been incorporated into an 8.69-mile-long segment (AU INJ01C1 _ T1005: Emma Lake Inlet) that begins at the inlet of Emma Lake (not including the lake itself) and includes the upstream portion of Emma Creek and the unnamed tributary.

Partners and Funding

Water quality improvements are the result of collaboration between the Lagrange County SWCD, IDEM, Indiana Department of Natural Resources, the Great Lakes Commission and NRCS. The Lagrange County SWCD sponsored the creation of the WMP, and coordinated the implementation of the paired watershed study. IDEM funded the WMP and BMP implementation with \$1,748,604 of CWA section 319 funding. The Indiana Department of Natural Resources and Great Lakes Commission both funded watershed land treatment practices and the implementation of the WMP, with contributions of \$75,000 from the former, and \$515,000 from the latter, respectively. NRCS provided \$5,328 in funding through the Agricultural Water Enhancement Program and was instrumental in providing engineering design and support. Lastly, watershed landowners independently paid \$30,000 to install BMPs without cost share.



U.S. Environmental Protection Agency
Office of Water
Washington, DC

EPA 841-F-15-001DD
July 2015

For additional information contact:

Laura Crane, IDEM
lcrane@idem.IN.gov • 317-308-3186

Angela Brown, IDEM
abrown@idem.IN.gov • 317-308-3206

Opportunities for Outreach

The US Census Bureau estimates that approximately 23% of Indiana's population is under the age of 18. In other words, there are over 1.5 million minors that live in the Hoosier state. Although Riverwatch workshops and data submission are reserved for adults, there are ample opportunities for engaging our youth within the program. By offering outreach opportunities to youth, we promote their development of social skills, critical thinking and foster positive relationships. Simultaneously, we help inspire the next generation of environmental stewards. The next three pages detail how Hoosier Riverwatch has offered outreach opportunities this summer.

Hoosier Riverwatch REACHes Indy Youth



Photo Courtesy: IDEM

Camptown, an Indianapolis non-profit that engages youth through outdoor education, began a new initiative in 2021 called "REACH for Nature". Funded by the IN Department of Education, the REACH program (Reimagining Enrichment, Academics, and Community Health) seeks to provide equitable opportunities for youth enrichment and development. REACH for Nature focuses on providing outdoor education to this audience. By May 2022, the club had served over 1,000 youth through backpacking expeditions, youth leadership programs, and other activities. REACH for Nature often invites guest speakers to share their knowledge with these students. Hoosier Riverwatch was able to become involved this way.

Dylan Allison, Hoosier Riverwatch Coordinator, met with students from Christian Park Elementary in Indianapolis to discuss water and its importance. The students, ranging from 3rd to 6th grade, participated in activities and games that related to concepts such as the hydrologic cycle, stream flow, and watersheds. Students finished the morning by sampling Pleasant Run for habitat quality, dissolved oxygen, and macroinvertebrates. The outreach event served as a fun educational experience and was a great way to connect with the community.



Photo Courtesy: IDEM



Photo Courtesy: IDEM

Hoosier Riverwatch Visits Boy Scouts

In September 2022, Hoosier Riverwatch Coordinator, Dylan Allison, visited Camp Belzer in Indianapolis to participate in one of the state's Cub Scout Fun Days. These one-day events are outdoor experiences for Scouts and their families. Stations around the property offered an assortment of activities including archery, an obstacle course, outdoor skills, and conservation stations. Over 150 families registered to attend the event.



Scouts and their families stopped by the Hoosier Riverwatch station to explore some of the water monitoring methods used by our volunteers. The station was located next to Fall Creek, a tributary of the west fork of the White River. Scouts were able to stand on the creek banks while evaluating its habitat quality. Next, they conducted chemical tests on creek water. Even the youngest Scouts enjoyed dipping pH strips and breaking the dissolved oxygen ampoules to compare the colors. Although Scouts did not actively sample for benthic macroinvertebrates within the creek, they were able to examine preserved specimens.

After the hands-on activities, discussions were had regarding how each sampling method helped determine the overall water quality of the creek. While Scouts received hands-on experience engaging in a STEM activity, the parents and Scout leaders learned more about becoming involved with the Hoosier Riverwatch program.

Thanks to the Boy Scouts of America and Camp Belzer for inviting Hoosier Riverwatch to participate in the event to increase our outreach & awareness!



Purdue Polytechnic High School

As the sampling season for IDEM's field staff was winding down, a teacher from Purdue Polytechnic High School in Indianapolis reached out to Hoosier Riverwatch staff. Mr. Homan, who leads an agriculture class for freshmen and sophomores, wanted to offer his students a hands-on experience related to water quality. Hoosier Riverwatch Coordinator, Dylan Allison, offered up the idea of sampling for macroinvertebrates. Mr. Homan enthusiastically accepted, and on a sunny fall day in October, the class met Dylan at a stretch of Fall Creek near the Millersville neighborhood of Indianapolis.



An overview of the Hoosier Riverwatch program was provided to students, detailing the collection of macroinvertebrates as one of the three criteria for indexing stream health. The class discussed the taxonomy of macroinvertebrates, how they fit into the ecosystem, and why they relate to water quality. The class broke into small teams, each outfitted with nets, identification keys, and other sampling equipment. Each team performed kick net activities as described in Hoosier Riverwatch workshops. Students shared their excitement as small organisms were found crawling across the seine nets.

After a period of time, the students brought their collections together to attempt identification. The class was led through a dichotomous key to classify the organisms they had collected. An assortment was identified, including mayflies, damselflies, and a freshwater mussel. The pollution tolerances of the animals were discussed; most of what was found were Group 1 (very intolerant of pollution) and Group 2 (moderately intolerant of pollution). Additionally, the class learned about the concern for many of Indiana's endangered mussels as the collected specimen was safely returned to its place in the creek.

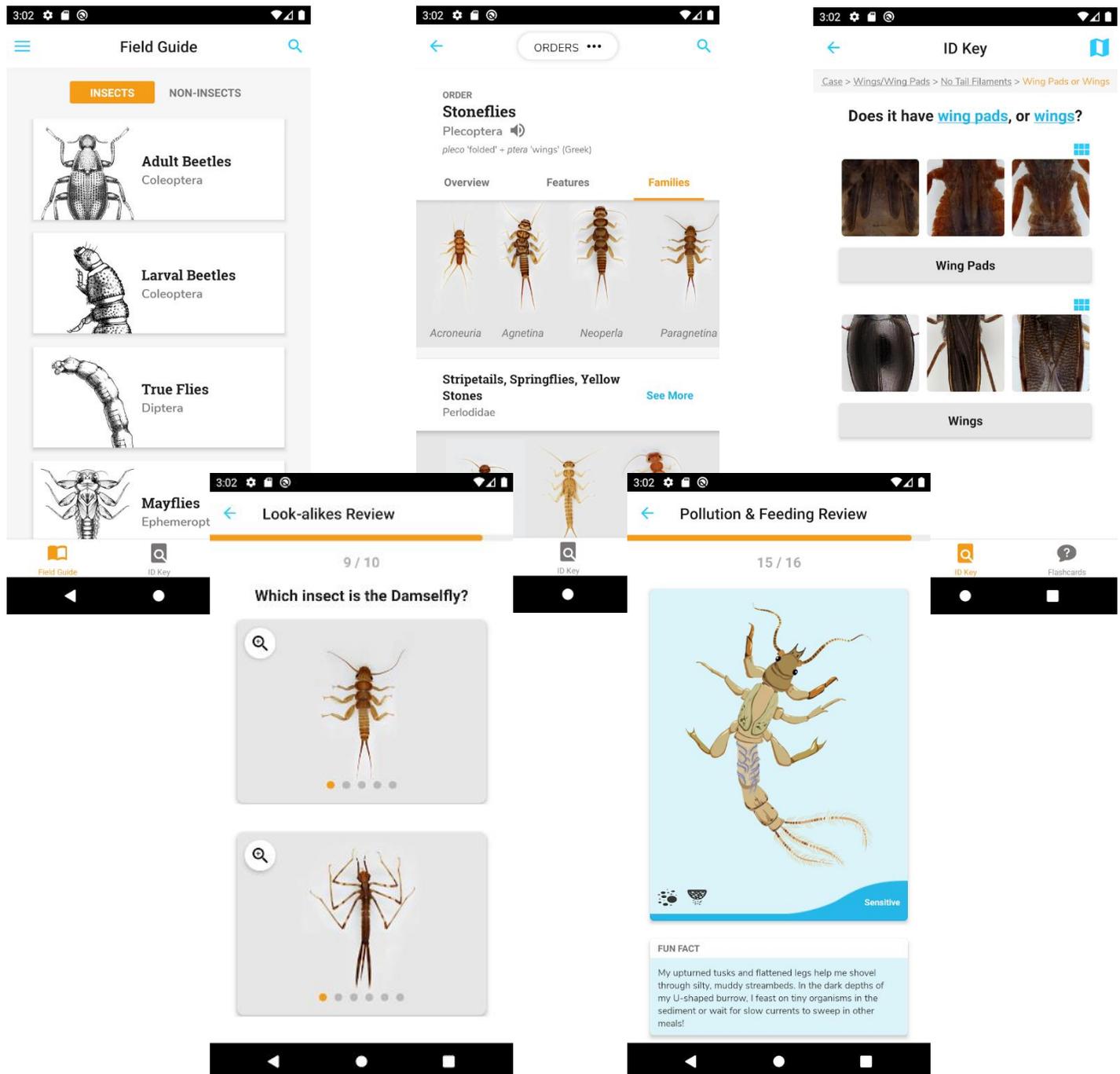


From their findings, the class determined that their portion of Fall Creek showed signs of low pollution levels. Students gained hands-on experience and a sneak peek into the criteria of the Hoosier Riverwatch program. Students didn't just leave with wet shoes; everyone went home with a poster illustrating the macroinvertebrates of Indiana.

PocketMacros App

Originally released in July 2021, the PocketMacros app offers users an interactive visual guide to help identify benthic macroinvertebrates. Updated in June 2022, the app includes a virtual field guide, an interactive identification key, and a flashcard quiz mode. High-resolution photographs allow users to zoom in on key features. A glossary offers definitions of anatomical and taxonomic terms. Check out the app for all your macroinvertebrate study needs!

This companion app to Macroinvertebrates.org is funded by the National Science Foundation. PocketMacros does not require an account or internet connection. Compatible with both Android and Apple devices.





**Indiana Department of
Environmental Management**
Office of Water Quality Watershed
Assessment and Planning Branch

100 North Senate Avenue,
MC 65-40 - 2 Shadeland
Indianapolis, Indiana
46204-2251

PHONE:
(317) 308-3392

E-MAIL:
riverwatch@idem.IN.gov

[CLICK HERE to
subscribe](#)

or go to:

www.idem.IN.gov



The Collective Tap

A new podcast, “The Collective Tap: Conversations About Water”, offers discussions between experts in their field regarding the value of water. From watering our front lawns to energy production, episodes focus on a variety of uses of this critical resource.



The Collective Tap is a project by the White River Alliance, made possible through funding from the Nina Mason Pulliam Charitable Trust. Listen for free on Spotify, Amazon Music, or wherever you get your podcasts.

Mark Your Calendars

Please note that the scheduled workshops have ended for the 2022 season. Check back again with us around February or March to see what is being scheduled for early spring 2023. If interested in scheduling a workshop in your area next year/season, please use the Instructor Locator Map found online at https://www.in.gov/idem/riverwatch/files/facilitator_map.pdf to contact someone near you for assistance. Otherwise, feel free to contact us at Riverwatch@idem.in.gov.

Riverwatch instructors- keep an eye on your emails! More info coming soon on an instructor gathering in late winter 2023.

IDEM Office of Water Quality Mission

The Office of Water Quality’s mission is to monitor, protect, and improve Indiana’s water quality to ensure its continued use as a drinking water source, habitat for wildlife, recreational resource, and economic asset. The office achieves this by developing rules, guidance, policies, and procedures; assessing surface and groundwater quality; regulating and monitoring drinking water supplies and wastewater facilities; protecting watersheds and wetlands; and providing outreach and assistance to the regulated community and the public while supporting environmentally responsible economic development.

Hoosier Riverwatch Mission

The mission of Hoosier Riverwatch is to involve the citizens of Indiana in becoming active stewards of Indiana’s water resources through watershed education, water monitoring, and clean-up activities. Hoosier Riverwatch is a water quality monitoring initiative sponsored by the **Indiana Department of Environmental Management's Office of Water Quality**.

For more information, go to www.idem.IN.gov/riverwatch.